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SUBJECT MATTER INDEX OF APPLICATIONS FOR PATENTS.

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Telegraphs; Telegraph Printing Apparatus.—A. C. Brown and H. A. C. Saunders, A. N. Brewtnell, J. Burton, E. H, Johnson, G. W. Toster, A. N. Rose, D. Rowell, J. Imray (com.), W. R. Lake (com), Sir J. Anderson and B. Smith, A. W. Lake (com.), W. Smith, J. N. Culbertson and J. W. Brown, H. J. Haddan (com.), E. G. Brewer (com.), S. Pitt (com.), C. F. and T. Varley.

Thrashing Machines, Reaping Machines.—R. G. Morton.

Threads and Yarns.—L. A. Groth (com.)

Tilling and Cultivating, &c.—J. Elkington (com.), G. P. Blake.

Tobacco and Snuff, Cigars, Cigar-Holders, Pipe and Cigar-lighters, Smoking Pipes, Tobacco Pouches, &c.—O. W. Barnsdale.

Tools, &c.—T. N. Robson.

Torpedos, &c.—C. A. McEvoy.

Tramway Carriages, &c.—H. Bettely, W. H. Beck (com.), J. and J. Quick, H. Grafton.

Tramways, &c.—R. S. Cunningham, C. A. F. V. Houssart and W. May, R. G. Garvie, A. J. Acaster.

Traps for Animals, &c.—J. C. B. Fox.

Traps for Drains, &c.—J. D. Taylor.

Trimmings, &c.—R. Joyce, F. W. Parker.

Tunnels, &c.—E. English, J. C. Baker.

Turning, Lathes, &c.—T. White.

Umbrellas, Parasols, &c.—R. H. Brandon (com.), A. J. Boult (com.)

Upholstery, &c.—G. Byron.

Valves, Taps, Stop Cocks. Plugs; Regulating the Flow and Pressure of Fluids.—W. Rose, J. R. Hargreaves, H. J. Haddan (com.), A. M. Clark (com.), D. R. Ashton and J. N. Sperryn, C. Stuart, H. J. Harman, J. Barr, H. J. Haddan (com.), J. J. Royle, T. G. Sharp, J. C. Millard, T. Rogers, H. H. Lake (com.), W. R. Lake (com.), C. W. Collins.

Velocipedes.—W. E. Price and W. D. Overton, W. T. Eades, F. Beauchamp. W. H. J. Grout, J. T. Townsend, N. R. Husberg, C. Beger, C. R. B. Hamilton, R. H. Berens. A. Lafargue, W. P. Thompson (com.), F. S. Kendrick, J. Harrington, J. White and J. Asbury.

Ventilation, &c.—G. W. von Nawrocki (com.), F. Leuhouldt, T. Rowan, J. C. Baker, D. Gill, H. S. Cregeen.

Washing, Cleansing, and Wringing Fabrics' Yarns, and Materials.—L. Webster, T. Bradford, W. Brooker, A. Mills. H. Webster, and J. Clegg, E. N. Knight.

Washing Minerals, &c.—J. Bell.

Water-Closets, &c.—C. Pieper (com.), D. G. Cameron.

Water-power, &c.—J. Chapman and R. H. Harper.

Wearing Apparel, &c.—W. R. Lake (com.),

Weaving, Braiding, Plaiting, Preparing for Weaving, &c.—J. Holding, A. Place, R. S. E. and R. Collings, W. R. Lake (com.), J. H. and L. Wilson. H. A. Bonneville (com.), R. and R. Vickers, J. Bullough, J. H. Johnson (com.) J. Holding, J. E. K. Dutton, J. Baird, J. Hardaker, J. and H. Smith (com.), J. O. Neil, G. Geissler.

Weighing, &c.—J. Post, R. Lamont.

Wheels for Carriages, &c.—W. R. Lake (com.). J. Smith, G. L. Scott.

Windows.—B. Cross.

Wire, Wire Working, &c.—A. W. Brewtnell, J. Hodson, E. G. Brewer (com.).

Wood.—D. Francke.

Wrenches, &c.—B. Godfried and F. Brittain.

Yeast, &c.—E. A. Brock.

*** *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

Button-hole Sewing Machine.—Mr. J. H. Munsons, of New York city, has patented an improvement in button-hole sewing machines. The object of this invention is twofold, namely, first, to avoid the inconvenience and expense of the breaking of the friction spring which bears on the carrier plate of a button-hole sewing machine, to hold said plate steady during the movement of it, which breakage has been due to the gradually increasing pressure as the work advances; and, secondly, to apply the requisite friction to the carrier plate before the sewing commences, and thereby avoid that unsteadiness of the carrier plate and irregularity of the sewing at the commencement of the button-hole, which takes place when the friction spring is fitted so that it does not touch the carrier plate till after the sewing has commenced. To these ends the invention consists in a friction arm pivoted to the bed plate, and bearing at its free end on the sliding carrier plate, by the action of a spiral spring contained in a socket that is fixed on the bed plate, This arm is so arranged that it bears on the carrier plate in a direction at right angles to the first or straight movement of said plate, so that the spring acts before the sewing commences. Said spring is arranged around a pin pivoted to the under side of the friction arm, and is held between a flange on the pin and the bottom of the hole in the socket. By this construction the required pressure can be obtained without risk of breakage.

Reviews.

PRACTICAL HYPSOMETRY.

"A Method of Determining Altitudes with the Aneroid Barometer, without Tables. By Edw. David Hearne, M.A. London: *Mining Journal*, 26, Fleet Street, E.C. 1882.

If a great book be a great evil, this must certainly be a very small evil, since it fills but eight tiny pages, 2 in. × 1¼ in., the usual proportion of which is occupied by margin. That barometrical observations give altitudes as accurately as trigonometrical cannot be pretended, but on the other hand a pocket aneroid can be carried by a scientific man or tourist when a theodolite, with all its encumbrances, is out of the question; and where approximation to within a few feet in the thousand will suffice for the object in view, the pocket aneroid is exceedingly useful. But, as is well known, the barometrical variations for altitude are not the same at all normal pressures nor at all normal temperatures; that is to say, speaking popularly, a less altitude may be indicated on a wet day than on a fine one, and a greater altitude may be indicated in the winter than in the summer. To correct these differences logarithmic tables, altitude tables, and complicated calculations have been resorted to, and hence many have regarded the obtaining of fairly correct altitudes with the aneroid as more nuisance that it is worth. By the extremely simple rule given in the present miniature volume, the corrections both for pressure and for temperature can be almost instantaneously made, and that, too, without referring to any table whatever, the results being as accurate as it is possible to obtain them with the barometer.

WIND, WATER, AND STEAM POWER.

"The Relative Advantages of Wind, Water, and Steam as Motive Powers, Compared with Each Other, and a Description of the Motors the most Suited for Utilising Them." By Samuel B. Goslin, Fell. of the Meteorological Society, Member of the Society of Arts, Co-operator's Prize Medallist, Vienna Exhibition, 1873. Author of "How to Avert or Mitigate Famines and Droughts," "Letters on Indian Famines," "Divisions of England for National Water Supply," &c. London: John Warner and Sons, The Crescent Foundry, Cripplegate, E.C., and M'Corquodale and Co., Limited, Cardington Street, N.W.

This is another addition to the list of pamphlets or books which are in general of a trade circular character, referring more or less to some particular industrial establishment, but it appears the kind of information Colonists and engineers, both civil and mechanical, at home and abroad, wherein some advice upon the selection of motive powers and motors suited to various conditions and circumstances has been solicited, rendering a practical work desirable.

It has been concluded that one of the easiest methods of answering such enquiries, and of helping those who desire some hints on such matters, is to commit to printing what otherwise must oft be repeated in parts more or less in writing, and the author hopes that the thoughts, suggestions, and sentiments herein expressed may be the means of helping to an advantageous conclusion in the selection of an auxiliary to manipulate the productions, to increase the utility of natural or local resources, and add to personal comforts of the world at large.

As far as we are concerned, on careful perusal of the book, we readily utter the opinion that the object of the work is fully sustained, and may fairly be considered as one of an especially useful kind.

Whatever may have been the conditions, surroundings, and forces with which the early inhabitants of the earth were aquainted, the reasoning powers of those who followed were soon brought by the necessities of life and existence to observe the forces of Nature, and the effects produced by the ever-changing elements, above, below, and around them. The dropping rain, the force of the streams and rivers, the mighty winds, the gentle breeze, the differences of heat and cold, the force and pressure of the air when in the valley compared with the hill-top or the mountain-side — these simple forces of Nature, twisting round the fallen leaf, driving the stubble before the wind, or making its whirlpool in the streams, drawing down the floating twig, or hurling along the rocks in torrents—these have spoken to the ignorant and uncivilised of very much later times in language sufficiently clear as to cause the utilisation of them in many forms.

It was a fact known by tradition and record in the early times, that the *Great Originator had used the force of the wind* "to move upon the face of the waters," to drive away the mists and darkness, as well as *to drain the earth;* to make "the dry land appear;" or, as in even later times, of the fact that when the pent-up family were drifting upon the floods, the wind was again used "to assuage the waters." Not that it is to be concluded that man was so impressed with this useful lesson when it was first given, for not until after much meditation and great inconvenience is it to be found that this "force of Nature" was employed in the manner stamped by Divinity as good.

The abundance of water and the force of the streams were utilised in very early ages for the purposes of irrigation, and to this day it can be easily shown that the utilisation of such power for certain objects is attended everywhere with abundant success.

Ever since the discovery and the introduction of steam as a motive-power, the forces and advantages of Nature's gifts have been neglected. Fashion has ruled the appliances of the day, even if it has led to the waste of time, labour, and capital in many places.

That wind and water powers have their advantages is easily demonstrated, and their respective advantages are easily compared the one with the other.

Whatever quarter or part of the world the student of engineering or the colonist may direct his attention to, there he finds the ample resources of power afforded by Nature of wind and water. Let it be India, Africa, or America, with their high and constant falls; Egypt, with its Cataracts of the Nile, The Cape, Australia, India, New Zealand, the West Indies, or other places, with their regular winds; or, nearer home (as it has been so recently computed and represented by James Price, M.I.C.E., of Dublin or Belfast, when reading his paper before British Association), "taking Ireland, 'a speck only of the earth's surface,' the crude horse-power of the wind passing over it would amount to 360,000,000 horse-power for a height of 70 feet, or six times greater power than the Falls of Niagara." The distribution of these helps is all but universal, the power immense, and this to be utilised.

Among the varied applications of Nature's gifts, those which serve for the purposes of civil engineering or colonial work appear to be the most universal and the most suitable. Every power, however, which can be employed has its special advantages in certain positions, localities, and under certain circumstances. It is for the engineers and colonists at all times, as it was for the architects of the early and middle ages in the choice of the materials for their churches and castles, to look about them wherever they may be called upon to design or to make applications, so as to devise and apply the best for the position and surroundings, and make the most of the most available and economic forces at hand.

The work contains valuable descriptions with illustrations as to water mills, old and new, windmills, and steam power.

ANNALS OF CHEMICAL MEDICINE.

"Annals of Chemical Medicine, including the Application of Chemistry to Physiology, Pathology, Therapeutics, Pharmacy, Toxicology, and Hygiene. Vol. II. Edited by J. L. W. THUDICHUM, M.D. London: Longmans, Green, & Co. 1881.

WE have not had the advantage of perusing the first volume of this interesting work, but if we take the present volume as a criterion of the contents of the first volume, we have no doubt but that it will be as acceptable as the first volume. These Annals of Chemical Medicine embrace many and various matters relating both to medicinal and chemical matters. Most of the contents of this volume relate more particularly to summary of results arrived at on various matters connected with chemical industry. We will confine ourselves to one or two papers or chapters which are the result of original research. One relates to researches on the chemical constitution of the non-phosphorised group of nitrogenised principles of the brain. The exhaustive paper, extending over fifty-three pages of the work, deserves the careful attention of all who may be interested in the subject. The paper does not allow of our quoting from, as this would give a very slight idea of its value.

The same remark applies to the other original paper above mentioned, and in fact to the whole work. To quote would, as before stated, give but a vague and very indefinite view of the work, and if we endeavoured so to do would take up more space than we can allow.

True there are various propositions and assertions made which we cannot accept, but still there is a vast amount of information in this volume which can be commended to the careful consideration of those engaged in the medical profession.

THE INSTITUTION OF CIVIL ENGINEERS.

THE Sixty-third Annual General Meeting was held on Tuesday, the 20th of December, the President, Mr. Abernethy, F.R.S.E., in the Chair.

The notice convening the meeting having been read, and scrutineers of the ballot for the election of a council for the ensuing year having been appointed, the Secretary read the annual report of the council upon the proceedings of the Institution during their period of office and upon its general condition.

It had been pointed out by Thomas Tredgold in 1828, when requested to define the nature and objects of civil engineering, that the domain of the civil engineer would extend with every discovery of science. A comparison of the papers contributed thirty years ago with those of the present day bore out this opinion, as it showed the great changes brought about in the interval in the practice of the profession by the new industrial applications of science. Having regard to the increasing number of subjects which occupied the attention of engineers, it was manifestly important that the papers read at the meetings of the Institution, and selected for publication, should be so varied as to be useful to its members in whatever branch of the profession they might be engaged. The tendency of modern manufacturing processes was to rely more and more upon machinery, the design and construction of which, as it became more elaborate, could no longer be the work of the mere handicraftsman, but called forth the highest powers of the skilled engineer. It thus happened that men were now to be found exercising engineering vocations widely different from those of the designers of roads, bridges, and similar public works, who, very erroneously, had often alone been recognized as civil engineers. As the Institution was largely composed of the former class, it was necessary that the range of subjects for papers should be widened, so that all interests might be consulted. The council appealed to the four volumes of minutes of proceedings issued since the last annual meeting, as evidence of the success that had been attained in this direction.

A short synopsis was then given of the contents of the four volumes. It was stated that, besides Mr. Abernethy's Address as President, which related mainly to the remarkable growth of dock and harbour accommodation for the commercial marine, fourteen papers had been read and discussed at the ordinary meetings, while thirty-seven other communications had been selected for printing, including six students' papers out of eighteen read at as many supplementary meetings. The combined articles ranged over most of the questions now occupying the attention of engineers. The foreign abstracts continued to be highly appreciated, especially by members resident in distant countries who were debarred from access to information respecting the progress of engineering on the Continent and in America.

The council had had the pleasure to award George Stephenson Medals and Telford Premiums to T. F. Brown, G. F. Adams, and B. Baker; a Watt Medal and a Telford Premium to J. I. Thornycroft; Telford Medals and Premiums to T. Seyrig, M. am Ende, and Dr. J. Weyrauch; Telford Premiums to R. H. Brunton, C. Colson, C. H. Meyer, B. Walker, J. R. Bell, J. L. F. Target, and W. T. H. Carrington; and the Manby Premium to J. P. Maxwell. It was stated that the dies for the George Stephenson Medals, now for the first time presented, had been purchased during the year from Messrs. J. S. and A. B. Wyon. The medal had on the obverse a portrait of that illustrious engineer, and on the reverse a representation of one of the earliest locomotives built by him. Miller Prizes had been bestowed upon the following students, viz.:—J. B. Hunter, M. B. Jamieson, T. Stewart, W. H. Edinger, D. Macalister, L. Burnet, E. W. N. Wood, A. S. Vowell, and W. Marriott.

The subject-matter index to the whole of the publications of the Institution, from 1837 to 1879 inclusive, which had been issued in autumn, might be said to mark an epoch in engineering literature. The approval with which it had been received was evidence that the unobtrusive but painstaking labour of the compilers was fully appreciated. A name index, which would be a complement to the other, was in course of preparation.

During the past year there had been an increase of 52 members, 119 associate members, and 49 students, with a decrease of 16 associates, while the honorary members remained the same. There were on the books on the 30th of November last 18 honorary members, 1261 members, 1406 associate members, 552 associates, and 662 students; together, 3899. At the same date in 1860, the number of members of all classes was exactly 1000. The student class had only been created fourteen years. In the interval, 1462 candidates had been admitted, of whom 400 had since been elected into the Corporation, and 400 had ceased to belong to the Institution and in most instances to the profession. The deceases had been at the rate of nearly 19 per 1000, and had included several very old members, notably Mr. James Ashwell, the survivor of the five founders of the Institution.

The income last year was £12,398 11s. 5d., besides which the receipts had included £3076 14s. on account of admission fees and life compositions (which were rigidly treated as capital, and were not used for defraying ordinary expenses), and £431 5s. 6d. from dividends on trust funds. The general expenditure had amounted to £12,092 7s. 11d., including £6523 17s. 8d. for four volumes of Minutes of Proceedings and for the subject-matter index. A sum of £3000 had been invested, and £390 0s. 1d. had been expended for premiums and prizes under trust. The cash balance in hand was £771 12s. 1d., being £424 2s. 11d. above what it was at the same period in 1880. The income had been nearly 4 per cent, and the total receipts 6 per cent, in excess of the previous year.

The nominal or par value of the investments held under trust was £14,642 13s. 10d., and of those belonging absolutely to the Corporation £36,838 11s. 8d., the dividends on the latter having contributed £1433 17s. 6d. to the income. It was stated that on the 30th of November, 1867, the Institution investments (irrespective of trust moneys) were of the nominal value of £17,133 1s. 3d.; that in the next two years £18,120 2s. 4d. had been paid for rebuilding and furnishing the enlarged premises, without the necessity for calling upon individual members for special subscriptions; and that the present capital had been the growth of little more than twelve years.

The President then presented the premiums and prizes to the respective recipients, and, in doing so, expressed his high sense of the obligations the general body of members were under to the authors of papers.

The report having been adopted, cordial votes of thanks were passed to the President, Vice-Presidents, and members of council, for their zeal on behalf of the Institution; to the auditors for the time and trouble they had bestowed in verifying the accounts; and to the secretaries for their services.

The scrutineers (to whom a vote of thanks was passed by acclamation) announced that the following gentlemen had been duly elected to serve on the council for the ensuing year:—Sir W. G. Armstrong, C.B., President; Mr. J. Brunlees, Sir J. W. Bazalgette, C.B., Sir Frederick Bramwell, and Mr. E Woods, Vice-Presidents; Mr. B. Baker, Mr. G. Berkley, Mr. G. B. Bruce, Sir John Coode, Mr. E. A. Cowper, Mr. J. N. Douglass, Mr. A. Giles, Mr. H. Hayter, Dr. W. Pole, Mr. R. Rawlinson, C.B., Mr. A. M. Rendel, Dr. C. W. Siemens, Mr. D. Stevenson, Sir William Thomson, and Sir J. Whitworth, Bart., other members of council.

FOREIGN PATENT LAWS.

III.—BRAZIL.

Patents are granted for terms varying from five to twenty years, the term being fixed by the Government. All inventions, as also improvements, are patentable. To persons importing new industries into the country the Government grants privileges, which, however, depend upon the Legislature for their confirmation.

If the invention is patented in any other country, same can only be protected by an exclusive privilege. Exclusive privileges are granted for the unexpired term of the foreign patent, but this privilege can be annulled by the Government on their paying the inventor a premium.

No tax is claimed by Government.

The patent must be worked within two years after the grant.

Drawings and description accompany application for patent or privilege.

An improved folding wardrobe bed has been patented by Mr. Ernest N. Doring, of New York city. This bed is so constructed that it will require less weight than heretofore to balance and keep in place. The invention consists in the combination, with the head boards and side boards, of curved friction bars pivoted at their lower ends and having their upper ends pressed forward by springs, whereby the pressure of the springs and curved bars against the ends of the sideboards will assist to keep the sideboards in any desired position.

FORCES AND STRAINS OF RECOIL.

At the meeting of the Institution of Civil Engineers on Tuesday, the 22nd of November, Mr. Abernethy, F.R.S.E., President, in the Chair, the Paper read was on the "Forces and Strains of Recoil considered with reference to the Elastic Field-Gun Carriage," by Mr. H. J. Butter, M. Inst. C.E.

It was stated to be of great importance in field-gun carriages to reduce the weight as much as possible, and this could only be safely effected by a correct appreciation of the action and extent of the force of recoil. Considerable obscurity existed in respect to this question. It was the object of this Paper to endeavour to define the action and laws which governed recoil, as well as to describe the principle and design of the Elastic Field-Gun Carriage.

The highest velocity of recoil, from which was calculated the energy, had not hitherto been observed, as was the case with that of the shot, but had been calculated from the principle of the assumed equality of momenta of the shot and gun.—*i.e.*, the product of the weight and highest velocity of the shot was divided by the weight of the gun $\left(V=\frac{v\,w}{W}\right)$ to obtain the highest velocity of the latter in recoil; this in itself failed to give the correct velocity.

It was generally stated that the highest pressure of recoil could not exceed the greatest powder-pressure on the bottom of the bore; but this assertion was shown to be inconsistent with the true nature of recoil. When a powder-charge was exploded in the chamber of a gun, the first effect was to compress the material at the base of the shot, and ultimately to overcome its inertia. The powder-pressure then continued to act upon the shot as an accelerating force, while, at the same time, the restitution, by means of its elasticity, of the shot to its original form, went on in opposition to the powder-pressure, and by these two actions combined, the shot, on leaving the muzzle, possessed all the energy developed by the powder-pressure in the bore. From several reliable observations, it had been determined that the shot was on the point of leaving, or had left, the muzzle when the gun began to recoil; hence its inertia was only just overcome during the time occupied in the passage of the shot along the bore. The 10-inch gun was 134 times the weight of the shot, and this explained the fact that while the powder-pressure had only time to complete the first half of the action of impact upon the gun, it wholly completed the pressure of impact upon the small mass of the shot, and further acted upon it for a considerable interval, comparatively, as an accelerating force. It was clear, therefore, that while the powder-pressure acted equally upon the gun and the shot, it did not, for want of the requisite time, store up so much energy in the former as in the latter, being in fact only about 1-100th part as much. The formula of the equality of momenta was thus shown to be insufficient to give the velocity of recoil, as it could only be true where the pressure of impact alone was concerned, and was completed alike in the two bodies.

The powder-pressure exhausted itself upon the gun in over-coming its elasticity longitudinally, since the inertia of the gun was barely overcome when the pressure ceased. Recoil was a purely dynamic effect, the resultant of all the powder-pressures combined, and could not be referred to any particular pressure, least of all to the maximum powder-pressure on the bottom of the bore, which occurred very early in the action, and was merely a part of the total pressure, which acted upon the gun before recoil began.

The adoption of pebble, or slow-burning powder, first directed attention to the insufficiency of the existing formula for finding the highest velocity of recoil. The hydraulic compressor was so constant in action that it indicated, in a perfectly reliable manner, the energy of recoil. When pebble was substituted for quick-burning (R.L.G.) powder, it was found that the resistance of the hydraulic compressor had to be increased one-third to maintain the same length of recoil, although equal energy was imparted to the shot; and as the resistance was proportional to the squares of the velocities of recoil, it followed that the ratio of the squares of the velocities, with the two kinds of powder, should be as 3 to 4. An opportunity had occurred to record the actual velocities by observation, and these were found to be such as to give, when squared, this ratio. Since in each case the same gun was used, and the momenta of the shot were identical, it followed that the present formula, which would produce the same velocity of recoil, could not give the true recoils resulting from the use of R.L.G. and pebble powders. The times during which the two kinds of powder acted in the bore, were, in 1-10,000th of a second, 85 and 112, which were nearly in the ratio of 3 to 4. These several facts enabled the existing formula to be corrected, and for pebble powder, used in the present general type of gun, the highest velocity of recoil might be found from the formula $\left(V=\frac{vw}{W}\sqrt{\frac{4}{3}}\right)$, and the energy from $\left(V=\frac{v^{2}W}{2g}\ .\ \frac{4}{3}\right)$.

The strain upon the gun-carriage arose mainly from the small interval of time during which the gun acted to overcome the resistance of the inertia of the carriage and set up its highest velocity. For instance, the 26-ton gun reached its highest velocity after 6 inches of movement, and while passing over this small space it had to overcome the inertia of the carriage and impart to it the highest velocity. A proof carriage for this gun had been made in which, by the introduction of a hydraulic compressor between the gun and the carriage, the action of overcoming the inertia of the latter, and of imparting the highest velocity, was delayed, and made to act over a space of 36 inches in place of one of 6 inches, thus reducing the mean strain to one-sixth, or the maximum strain to one-tenth. This constitued the principle of the so-called elastic gun-carriage.

The present type of field carriage had to take up its highest velocity from the gun, while the latter moved over a space of only about 1½ inch, and this, with the new 12½ pr. gun, would give a maximum pressure, momentarily applied, of about 92 tons; but by adopting the elastic principle this pressure might be reduced to 11⅓ tons, and thus enable a carriage to be constructed of the least possible weight. As the strains of travelling incurred by artillery were nearly as great as those resulting from firing, it was proposed to extend the application of the principle to the limber and wagon as well as to the carriage.

Since the correctness of many of the foregoing observations depended upon the reliability of the pressure diagrams of recoil, which indicated a considerable wave action, due to the vibrations of the spring of the pressure gauge, it was deemed necessary to ascertain by means of an apparatus, which could be made to impart known pressures suddenly to the gauge, the true value of the curves produced. The results confirmed the reliability of the pressure-curves of recoil, and showed that the area of any pressure-curve, no matter how wavy, gave the true value of the total work or energy. The waves were shown to be isochronous, and thus afforded the means of estimating from them the highest velocity of recoil. This velocity might also be calculated from the total energy represented by the area of the curves.

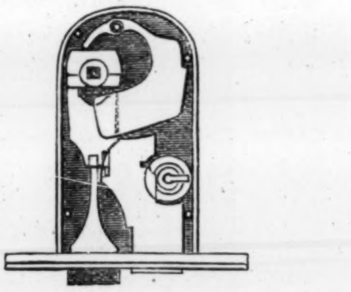
Thus, three new methods had been established for ascertaining the highest velocity of recoil; applying them to the case of the 43-ton gun, they gave the following results:—

	Ft. per Second.
From the corrected formula . . .	18·7
„ time waves of the curves .	18·6
„ areas of the curves of recoil	19·0
Mean . . .	18·8

So remarkable a degree of uniformity might be taken as additional proof of the correctness of each result. The velocity, as calculated by the formula now in use, was 1·62 feet per second, giving an energy of recoil of only 465,550 foot-lbs., while the correct energy of recoil was 654,640 foot-lbs.

WHITE'S PATENT SPRINGLESS LOCK.

This is an invention of improvements in locks or latches, and in attachments for the same. Its advantages are briefly as follows:—Instead of the springs ordinarily used in door-locks and latches is substituted a weighted lever, which produces the same result as the spring in forcing out the latch after being drawn in by the operation of the handle in the usual way. The latch is opened by either a single or double follower, and the short end of the lever being pressed back, raises the weighted end, which again falls and returns the latch to its place. A reference to the accompanying illustration will serve to show the merits of this very ingenious invention. The handle, which is easily fixed and equally easily removed, turns either way with a smooth and easy double action, and as there are no springs there can be no breakage or stiffening of these troublesome portions of most locks.



Stem-winding Watches.—Mr. John G. Carnahan, of Oxford, Ind., has patented an improvement in stem-winding watches which is both simple and efficient. The invention relates to that class of stem-winding watches in which the winding and hand-setting mechanism is engaged with the gearing for winding up the mainspring and the gearing for setting the hands by the longitudinal movement of the stem. In the present invention, when it is desired to set the hands, the stem is first drawn out, which causes a collar on the inner end of it to bear on a stud in the shorter arm of a two-armed curved lever and so depress the long arm of the latter, which turns a yoke and disengages the gearing from the mainspring arbour, and connects an independent wheel with the hand-setting train to which motion is imparted by turning the stem. As soon as pulling on the stem ceases the yoke is thrown back to its place by a spring. Normally another wheel, carried by the yoke, meshes with the arbour wheel of the mainspring, and is thus always ready for winding by pressing down upon and turning the stem.

The Scientific Review

AND

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THE INVENTOR'S INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE, LONDON.

Established 1st May, 1862.

Past Presidents:

Sir David Brewster, K.H., LL.D., F.R.S., &c., from the establishment of the Inventors' Institute, till his decease, February, 1868. Lord Richard Grosvenor, M.P.

Subscriptions are payable to Mr. G. A. Stretton, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. Campin, Sec.

SESSION 1881—1882.

Council Meeting January 26th.

Monthly Notices.

The Director-General of the Geological Survey was knighted by Her Majesty on December 17. Sir Andrew Ramsay, having completed his forty years of service on the Geological Survey, retires at the end of the present year.

We have to announce the death of M. Alfred Gautier, for many years Professor of Astronomy at Geneva, which occurred on the 2nd December last, at the venerable age of eighty-nine.

Chinchona Bark—Collecting without Loss of Substance.—The Java process of shaving the bark of the chinchona, which was introduced into Darjeeling by Dr. King, has proved a decided success. The bark renews itself perfectly within about a year, and the trees do not appear to have suffered the least check.

A Battery of new construction for the storage of electricity has been invented by Mr. Henry Sutton, of Ballarat, Australia. It is said to be more efficient than any yet produced for the same purpose, as will be seen on publication of the description, which, as we understand, will be given shortly.—*Athenæum.*

Mr. Charles Moore, of Bath, died on the 7th December, at the age of sixty-seven years. Mr. Moore has been for many years a most zealous geological observer, working over an especially interesting field—that surrounding Bristol. His examination of the condition of mineral lodes with especial reference to microscopic organisms which he found to exist in some of them was his most important work. Mr. Moore devoted much attention to the Bath Museum. He was elected a Fellow of the Geological Society in 1854.—*Athenæum.*

M. Goppelsrœder, of Mulhouse, has recently been showing the feasibility of making certain colouring matters by electrolysis, which he first announced in 1875 in a paper to the Industrial Society of Mulhouse. It is not possible for us to describe all M. Goppelsrœder's experiments, the result of which are so interesting. Many of the most beautiful of the aniline colours are obtained by him by the electrolysis of the chlorhydrates of methaniline and other aniline products. Artificial alizarine is prepared at the positive pole from a mixture of anthraquinone and caustic potash. All the results are highly promising.

Messrs. Weitt and Merz, of Zurich, have been turning naphthalene, a beautiful white crystalline substance, but hitherto regarded as a waste product, to good account. The naphthalene colours produced by this firm are characterized by fine yellow and red tints, their latest discovery being a dye of a singular golden hue, to which the name of "sun-gold" has been given.

Patent Office.—We have to return, says the *Athenæum*, to a subject which we noticed about five years ago. The authorities at the Patent Office have recently been weeding their library, and have once more thrown out their set of the *Gentleman's Magazine*, the *Lady's Diary*, the bound volumes of the *Times*, and other serial publications, many of which are valuable to a student of the history of science and invention. This parsimony is to be regretted as the Patent Office library contains a large and valuable collection of English and foreign periodicals and transactions of learned societies, and is the only free public library in the neighbourhood of Fleet Street, and the only one of its kind in London.

Dr. Warren De La Rue has been nominated Correspondent of the Academy of Sciences of Paris and a Commander of the Legion of Honour, on the proposition of M. Cochéry, Minister of Posts and Telegraphs. This is in recognition of his services at the electrical congress and as vice-president of the jury. Dr. Warren De La Rue, in consequence of ill health, has been compelled to resign the post of honorary secretary to the Royal Institution.

Oxygen.—Mr. Jolly has observed a variation in the ratio of oxygen to nitrogen in the atmosphere of a given place, and he has suggested a certain hypothesis to explain it, supposing the volume of air showing this deficiency to come from tropical regions, where the consumption of oxygen in the oxidation of organic matter is greatly increased.

M. Quatrefages sends to the Académie des Sciences a note, which was read at the Séance for November 28th, on "L'Homme Fossile de Lagoa-Santa (Brésil) et ses Descendants Actuels."

THE SCIENTIFIC REVIEW
AND
Scientific and Literary Review
INCORPORATING THE "JOURNAL OF THE INVENTORS' INSTITUTE."

JANUARY, 1882.

THE DECEASED TWO PRESIDENTS OF THE INVENTORS' INSTITUTE.

Some twenty years ago a strong feeling pervaded this country that commercial protection ought to be utterly forgotten by the freetraders, who could not again deal with protection or anything savouring of it, for, as far as foreign trade might be concerned, we had nothing to do with the matter, except to take care to tax not the foreigner; John Bull being kept, however, properly burdened with rates and taxes. In this state of transcendental public feeling the utterances of men of position if in favour (and those not in favour would not be heard, as being of the wrong headed and foolish classes—*vide* JOHN BRIGHT), including several of our eminent Industrials, such as Sir W. ARMSTRONG, with Lord Chancellor SELBORNE, who made friends with the *Times*, and, in their own estimation, the Patent Laws were defeated, stamped out, and destroyed. To reverse all this, Messrs. LATHAM, CAMPIN, with a number of British Inventors, who were then as now before the world, BESSEMER, SIEMENS, THOMSON, VARLEY, RICHARDSON, BARLOW, and with others of eminence, formed the Inventors' Institute: and Oh! great and glorious triumph! succeeded in obtaining as an adherent to the cause that great scientist and scientific *litterateur*, Sir DAVID BREWSTER, whose centenary has lately been celebrated in Scotland, and soon he became the first President of the Institute, by and with whose aid and assistance the Inventors' Institute showed such a front that the Anti-Patent Law party soon began to find that Anti-Patentism was a "gone coon." Sir DAVID BREWSTER as a man of peerless pre-eminence in front, with great men of practical science coming on behind. That Sir DAVID was the power we deem him anyone who reads the following memoir from the *Times* will allow :—

The admirers of Brewster did not expect his festival to excite the wide and deep interest called forth by those of Burns and Scott; yet the proposal to commemorate his birth 100 years ago was received with very general favour. His career is one on which Scotchmen may dwell with pride. The son of a provincial schoolmaster, he raised himself by the sheer force of his intellect and by his persevering energy to the front rank of British men of science. This is the kind of life—a life ever seeking upwards and achieving success by unaided effort—that appeals most effectively to the sympathies of Scotchmen. But Brewster's wide popularity is due, in great measure, to the variety of his powers and to the different fields in which he exercised them. He was at once a discoverer and inventor, a careful recorder of the progress of science for the learned, and a brilliant expounder of its secrets to the unlearned. His labours thus appealed to different classes. As the discoverer of the law of polarization by light, of biaxial crystals, of optical mineralogy, and of double refraction by irregular beating, his name must be respected by men of science. As the inventor of the kaleidoscope, of the lenticular stereoscope, and of the dioptric apparatus for the illumination of lighthouses, he has earned the admiration and the gratitude of a wider class. Perhaps he is known best of all, however, as a brilliant and voluminous writer on scientific subjects. Brewster shared the fate of the greatest inventors in being deprived of the credit of his most important invention—the dioptric lens. Fresnel, who, no doubt, worked independently, did not complete his apparatus till ten years after Brewster had described his; but Fresnel had the good fortune to get his lens first adopted in practice; and hence his name is popularly attached to it. It is a repetition of the case of Adam and Leverrier in the discovery of the planet Neptune. In another aspect it suggests the case of Columbus and Amerigo Vespucci in connexion with the naming of the Western Continent. Brewster's literary powers far excelled those which scientific men usually have at command, and this is doubtless the secret of the strong hold he had on the minds of his countrymen. His capacity for work, both literary and scientific, was enormous, and his working life was unusually long. He began to write in the magazines at the age of 18 or 19. He published his life of Newton in his 74th year, and he lived for 13 years after that, in the full possession of his faculties. During the long intervening period his pen had seldom been idle. He edited the *Edinburgh Encyclopædia* for 22 years. He edited numerous scientific and philosophical journals. In the course of 20 years he contributed no less than 75 articles to the *North British Review*. He also contributed extensively to the seventh and eighth editions of the "Encyclopædia Britannica." His occasional papers read before scientific societies numbered 315. BREWSTER was one of the founders of the British Association. But after all that can be said in praise of Sir DAVID, his work as President of the Inventors' Institute was a great point, for he was thorough and reliable till his death, as readers of the SCIENTIFIC REVIEW will see.

Upon his decease the Presidency was placed with Lord RICHARD GROSVENOR, who, under Sir DAVID's Presidentship, had been Chairman of Council. Pressure of public business led to his lordship's resignation, and our late highly esteemed and much lamented friend Sir ANTONIO BRADY, who died suddenly on Monday, December 12th, 1881, was elected President, and held office at the time of his death, and often took the chair, the last occasion being the Inventors' Dinner at St. James's Hall last November. He was greatly interested in all attempts to improve the Patent-law, and at the last meeting of the British Association at York, he spoke in favour of the Society of Arts' Patent Bill. He was greatly instrumental in the foundation of the Bethnal-green Museum, on the establishment of which (in 1872) a congratulatory dinner was given in his honour. Sir ANTONIO BRADY was the eldest son of the late Mr. ANTONY BRADY, of the Royal William Victualling-yard, Plymouth, by Marianne, daughter of the late FRANCIS PERIGAL, and was born in 1811. He entered the civil service of the Navy as junior clerk in the Victualling yard, Deptford, and having served there and at Plymouth and Portsmouth, was promoted to head-quarters, at Somerset-house, and in 1854 became head of the contract office and registrar of public securities. He subsequently assisted in the re-organisation of that office, and was the first superintendent of the new purchase and contract department. He retired from the service in 1870, when he was knighted, and henceforth gave up his time and talents in the promotion of social, educational, and religious reforms. He was Judge in the Court of the Verderers for the Forest of Epping, which he was greatly instrumental in preserving for the public use, and was fellow of several scientific societies. He was prominent among the promoters of the Smoke Abatement Exhibition, now being held at South Kensington, and arranged to read a paper the week his death took place, at the Brighton Health Congress.

The Council of the Inventors' Institute sent a deputation to attend his obsequies; this consisted of Admiral SELWYN, and Messrs. F. W. CAMPIN, T. MORGAN, F. H. VARLEY, G. E. PRITCHETT, and NEWTON WILSON.

Proceedings of Societies.

ROYAL SOCIETY.

Dec. 8.—The President in the chair.—The following papers were read: "The genus Culeolus," by Dr. W. A. Herdman.—"On the Development of the Skull in *Lepidosteus osseus*," by Mr. W. K. Parker,—"On the Structure and Development of Lepidosteus," by Messrs. F. M. Balfour and W. N. Parker.—"On a New Mineral found in the Island of Cyprus," by Mr. P. F. Reinsch,—"On certain Points in the Anatomy of Chiton," by Mr. A. Sedgwick,—"The Action of Cutting Tools, by Mr. A. Mallock,—"On Seismic Experiments," by Messrs. J. Milne and T. Gray,—"On the Electrolytic Diffusion of Liquids," by Dr. G. Gore,—"On the Co-efficients of Contraction and Expansion by Heat of the Iodide of Silver, the Iodide of Copper, and of Five Alloys of these Iodides, by Mr. G. F. Rodwell,—and "On the Vibrations of a Vortex Ring; and the Action upon each other of Two Vortices in a Perfect Fluid," by Mr. J, J. Thomson.

Dec. 15.—The President in the chair.—The Right Hon. Sir W. Vernon Harcourt was elected a Fellow.—The following papers were read: "On the Excitatory Process in the Leaf of Dionæa," by Dr. Sanderson,—"Some Effects of transmitting Electric Currents through Magnetized Electrolytes," by Mr. G. Gore.—"Preliminary Report to the Solar Physics Committee on the Sun-spot Observations made at Kensington," by Mr. J. N. Lockyer.—"On beta-Lutidine," by Mr. C. G. Williams,—"On the Effect of the Spectrum on the Haloid Salts of Silver and on Mixtures of the Same," by Capt, Abney, and "On a New Electrical Storage Battery," by Mr. H. Sutton (Ballarat, Australia).

INSTITUTION OF CIVIL ENGINEERS.

Dec. 6.—Mr. Abernethy, President, in the chair.—The Council have recently transferred Messrs. W. T. H. Carrington, A. C. Cregeen, G. G. Dick, D. M. F. Gaskin, J. G. H. Glass, J. A. Jones, and H. B. Joyner to the class of Members, and have admitted fifty-two as Students.—At the first monthly ballot of the session the Duke of Devonshire, Earl Granville, and Mr. F. A. Abel were elected Honorary Members; nineteen Members were elected, sixty Associate Members, and three Associates.—Two papers on "The Conservancy of Rivers" were submitted. The first, relative to "The Eastern Midland District of England," by Mr. W. H. Wheeler, was read in an abridged form; and the second, which dealt with "The River Irwell," by Mr. A. Jacob, B.A., was unavoidably read in abstract.

SOCIETY OF ARTS

Dec. 2.—The Hon. Mr. Justice Stephen in the chair.—This was a public meeting, specially held for the consideration and discussion of the Patent Bill prepared by the Society of Arts. The discussion was opened by Sir F. Bramwell, Chairman of the Council of the Society, and was continued by Mr. Justice Stephen and other authorities on the question.—The meeting was adjourned.

Dec. 5.—Mr. T. Bolas delivered the third of his course of Cantor Lectures "On some of the Industrial Uses of the Galcium Compounds."

Dec. 7.—Dr. C. W. Siemens in the chair.—A paper "On the Combination System of Steam-Heating for Towns and Villages as at present adopted in America," was read by Capt. D. Galton.

SOCIETY OF ENGINEERS.

Dec. 5.—Mr. C. Horsley, President, in the chair. The paper read was by Mr. W. B. Kinsey, "On Arrangement, Construction, and Machinery of Breweries."

ROYAL INSTITUTION.

Dec. 5.—Mr. G. Busk, Treas, and V.P., in the chair.—Mrs. V. De Horne, Dr. W. R. Pugh, Messrs. H. Chester, J. Grey, V. C. Miles, G. E. Nash, J. B. Scriven, F. Whitaker, and R. P. Wilson, were elected Members.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

Dec. 6.—Dr. S. Birch, President, in the chair.—Mr. Theo. G. Pinches read some remarks upon the Cappadocian tablet preserved in the Bibliothèque Nationale and that in the British Museum. Casts of the tablet were exhibited.

SHORTHAND SOCIETY.

Dec. 6.—Mr. C. Walford, President, in the chair.—Twenty-four new Members were elected, including two Foreign Associates,—Mr. H. Richter (Foreign Secretary) presented a communication on German systems of shorthand, by M. Guénin, chief reviser of the reporting corps in the French Senate, but the reading was deferred to the next meeting.—Mr. A. L. Lewis exhibited a MS. Bible in his father's system.—It was mentioned in discussion that three such MS. Bibles in Taylor's system, written by Mr. T. J. Woods, were in the library of the Shorthand Writers' Association.—Mr. J. Westby-Gibson read an interesting paper, which gave rise to some discussion, on early shorthand. He described the results of recent investigation in the British Museum. He had found three or four systems between the dates of 1600 and 1625 which were not mentioned in the shorthand histories. He stated that the cipher used by Charles I, was identical with that used by the Marquis of Worcester.

MATHEMATICAL SOCIETY.

Dec. 8.—Mr. S. Roberts, President, in the chair.—Mr. G. H. Stuart was elected a Member, and Miss C. A. Scott was admitted into the Society.—The following papers were read: "On the Polar Planes of Four Quadrics," by Mr. W. Spottiswoode,—"On some Forms of Cubic Determinants," by Mr. R. F. Scott,—"On the Flow of a Viscous Fluid through a Pipe or Channel," by Prof. Greenhill,—and "The Co-Variant which is the complete Locus of the Vertex of the Involution Pencil of Tangents to a Cubic," by Mr. J. J. Walker.

NEW SHAKESPERE.

Dec. 9.—Mr. Furnivall, Director, in the chair.—Miss E. H. Hickey read a paper "On 'Romeo and Juliet,'" and called attention to the difference between this, Shakspeare's first tragedy, the only one in which love plays the part of parts, and his other tragedies later by many years. The difference in Romeo's language after he has come under the influence of his second and true love was also noticeable; no more antitheses about "heavy lightness," &c. Romeo's character was one of truest courtesy and grace; the Friar replies to his salutation, "What early tongue so sweet saluteth me?" and while describing his passion to Benvolio he can break off to salute the puzzled serving-man and help him out of his trouble. Dr. B. Nicholson read some notes on the following passages in "Hamlet:" 1, "Mortal coil," which he defended against Mason's and Prof. Elze's changes, and gave instances in favour of the nautical sense of the word; 2, "Sables," obscure only because commentators did not consider how Shakspeare dressed his characters: Hamlet in "inky" black, Claudius and Gertrude in, as it were, half mourning; 3, "Comma," which he declined to change; and 4, "All the world's a stage," which, with the "seven ages," was not original. He quoted instances from the Fathers, &c., the Globe motto was "Totus mundus agit histrionem," and there were other examples, as in Withals's dictionary. Dr. Bayne strongly supported Warburton's reading. "Nay, then, the devil may wear black 'fore I'll have a suit of sables."—Mr. Furnivall discussed the possibility of "comma" being used in the sense of a hyphen.

HISTORICAL SOCIETY.

Dec. 9.—Annual General Meeting.—Mr. C. Walford in the chair.—The Report of the Council and the Treasurer's accounts were received and adopted; and Lord Selborne and the Earl of Rosebery were re-elected Vice-Presidents; and Dr. Zerffi, Earl Ferrers, Lord Gower, and the Rev. J. M. Crombie were re-elected Members of the Council.

PHYSICAL SOCIETY.

Dec. 10.—Prof. W. G. Adams in the chair. The following gentlemen were elected Members: Lieut. C. E. Gladstone, Lieut. C. G. Dicken, Mr. W. G. Woolcombe, Rev. Prof. S. Sircomb, and Mr. A. Clayden.—The meeting adjourned to see the Smoke Abatement Exhibition under the lead of Prof. C. Roberts.

ARISTOTELIAN SOCIETY.

Dec. 5.—Mr. S. H. Hodgson, President, in the chair —A discussion took place upon "Cause", and its dependent ideas—"law, condition, power, agency, final cause, cause of knowing," and "relation" generally.

EDUCATION SOCIETY.

Dec. 12.—Dr. Gladstone in the chair.—Mrs. Bryant read a paper "On Herbert Spencer's Educational Writings." Confining herself to the question of the relative importance of subjects and the formation of the curriculum, she showed that Mr. Spencer's method of reasoning on education is purely deductive, and that his conclusions, though logically reduced, have never been put into practice by teachers. Criticizing his argument in detail, she showed that Mr. Spencer assumes without sufficient proof, firstly, that the value of a study as discipline is in proportion to its value for knowledge giving; secondly, that the highest achievements of art require a knowledge of the principles of science, physical and mental, on the part of the artist.

GEOGRAPHICAL SOCIETY.

Dec. 12.—Major-General Sir Henry C. Rawlinson, V.P., in the chair.—The following gentlemen were elected Fellows: Rev. J. Greenfield, Messrs. A. W. Anderson, A. C. Cork, H. A. Erlebach, H. C. Langton, T. V. Smith, A. J. Teil, G. Vale, and E. Wahab.—The papers read were: "On the Searches for the United States Jeannette Expedition," by Mr. C. R. Markham, with a Note by Admiral Sir R. Collinson,—and "On the Dutch Arctic Voyages, with Notes on the Position of Mr. L. Smith," by Commodore Jansen.

ASTRONOMICAL SOCIETY.

Dec. 9.—Mr. Dunkin in the chair.—Mr. J. M'Cance was elected a Fellow.—Mr. Common read a paper on a method of silvering large mirrors. His own mirror, which is thirty-seven inches in diameter and four and a half inches thick, weighs over 400 lbs. There is consequently considerable difficulty in turning it face downwards and placing it in the silvering solution so as to avoid bubbles. His method is to attach a large iron sucker to the back of the mirror; the air is then partially exhausted, and the sucker, which consists of a shallow iron box standing on an indiarubber ring, can be moved by means of pulleys, and carries the mirror without danger of strain or breakage. He had tried several silvering solutions, but now uses grape sugar and nitrate of silver.—Mr. Stone read a paper "On a New Form of Transit Instrument," in which he proposes to replace the crown lens of the object glass by a totally reflecting prism. The hinder face is ground to a concave spherical surface, and immediately behind the prism a flint convex lens is placed, which forms, together with the prism, an achromatic combination, so that the rays will be brought to a focus in a direction at right angles to their original course. The observer will consequently be able to stand in one position, looking east or west, and by turning the prismatic object glass round on its axis will be able to observe the transit of any object on the meridian.—Mr. Penrose read and explained a paper on a graphic method of finding the elements of the orbit of a comet.—The Chairman read a letter from Dr. Murray, the editor of the Philological Society's Dictionary, asking for information with respect to the first use of the words "perihelion" and "aphelion."—Mr. Christie stated that Mr. Wesley, after making a search in the works of Copernicus and Kepler, had come to the conclusion that the words were introduced by Kepler, and that older astronomers made use of the words "apogee" and "perigee."—The following papers were also announced and partly read:—"On Observations of Venus in the Spring of 1881," and "On Radiant Points of Shooting Stars observed at Bristol in the Years 1878 and 1879," by Mr. W. F. Denning,—"On the Motion of the Companion of Sirius," by Mr. W. E. Plummer,—"Note on the Variable Star D. M. + 1° No. 3408," by Prof. C. Pritchard,—"On the Conjunction of the Satellites of Uranus with each other which may be observable from February to June, 1882," by Mr. A. Marth,—"Note on Messrs. Campbell and Veison's paper on the Parallactic Inequality in the Supplementary Number of the Monthly Notice," by Mr. E. J. Stone,—"Observations of Mimas, 1881, by Mr. A. A. Common,—and "Note on the Discovery of Comet *c*, 1881 (Schaberle)," by Mr. W. F. Denning.

SOCIETY OF ANTIQUARIES.

Dec. 8.—Mr. A. W. Franks, V.P., in the chair.—The Rev. F. E. Warren, B.D.. read a paper on some Saxon manumissions (which had escaped the notice of Hickes and Thorpe) on the eighth leaf of Leofric Missal (Bodleian MS. No. 579). It was only a few days before reading this communication that Mr. Davidson in an appendix to a learned paper on some Anglo-Saxon boundaries in the *Transactions* of the Devonshire Association, vol. vii. p. 417. There were, however, some discrepancies in the reading of the MS., which he was anxious to submit to the judgment of the meeting. Mr. Warren also called attention to the Calendar of the Missal.—Dr. Baron read some notes on an old dowry chest of white cedar, 6 feet long, 3 feet high, and 2 feet 6 inches from front to back: the inscription on it appeared to be in Portuguese, and to be an adaptation of Psalm cxxvii. 4-7,—also on a small MS. on stenography, by J: Will:, which Dr. Baron conjectured might stand for J. Willis, who appeared at the close of the sixteenth century to have invented a regular alphabet on stenography. Dr. Baron also laid before the Society a paper on some architectural features of interest in the church of Manningford Bruce, Wilts. The object of the paper appeared to be to show that in certain apsidal churches in this country and abroad the architecture was suggested by ideas and associations borrowed from the ritual of the Greek Church.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

Dec. 7.—Mr. T. Morgan in the chair.—Major P. di Cesnola exhibited a large collection of ancient Greek glass vessels from Cyprus, showing the progress of glass manufacture. The articles were mostly of small size and beautifully worked with the well-known radiating and wavy patterns, many of which, as was remarked during the discussion which followed, were to be found also in the Venetian glass of mediæval times.—Mr. W. Myers exhibited a collection of antiquities of continental origin. Among these were some worked flints acquired at Copenhagen, and many fine and beautiful specimens of Roman fibulæ and Egyptian bronzes.—Mr. C. H. Compton described some Roman Samian ware from Germany, in every respect similar to what is found in London, affording additional evidence of the fabrication of the articles in the Rhenish provinces.—Mr. R. Allen exhibited a series of drawings of Transitional Norman ironwork from churches in Shropshire.—In the absence of the Rev. Dr. Hooppell, his paper on a supposed Saxon cbuach in North Gosforth Park was deferred. The ruins are not far from Low Gosforth House.—A report was then made by Mr. L. Brock of the uncovering of the remaint of Carrow Nunnery. Norwich, by Mr. J. J. Colman, M.P. The site was all but covered at the time of the visit of the Association in 1879, but the excavations undertaken have led to the recovery of the entire ground plan of the building. It is found to agree with the general arrangements of a Benedictine monastery. The church is cruciform, and has had a central tower. The bases of several of the late eleventh century columns remain, and also those of two of the side altars. The chapter house has been a small apartment, while the day room has been of considerable extent. A quantity of elaborately moulded stones and carved capitals have been recovered. The lecturer's remarks were illustrated by a large plan of the remains, prepared by Mr. A. G. King, who has superintended the works, and who gave further particulars. A series of photographs, sent by Mr. Colman, were also exhibited.—The meeting was brought to a close by a review of the proceedings of the Congress at Great Malvern, by the Chairman.

GEOLOGICAL SOCIETY.

Dec. 7.—Mr. R. Etheridge, President, in the chair.—Rev. E. C. Pritchard, Rev. A. Simpson, Prof. W. Waagen, Messrs. W. A. T. Amherst, R. E. Creswell, W. R. E. Hodgkinson, S. D. Macdonald, F. J. Webb, and C. H. Wilson were elected Fellows. The following communications were read: "On the Zones of the Blackdown Beds and their Correlation with those of Haldon, with a List of the Fossils," by the Rev. W. Downes,—"On some New or Little-known Jurassic Crinoids," by Mr. P. H. Carpenter,—and "Notes on the Polyzoa of the Wenlock Shales, Wenlock Limestone, and Shales over the Wenlock Limestone, from Material supplied by Mr. G. Maw," by Mr. G. R. Vine.

ASIATIC SOCIETY.

Dec. 19.—Colonel Yule, V.P., in the chair.—The following gentlemen were elected as Resident Members: Messrs. B. V. Head, J. Haynes, T. G. Pinches, A. Lillie, and Henry C. Kay; and as Non-Resident Members, Major Thomson and the Rev. J. Drew Bate.—M. Bertin read a paper "On the Origin of the Phœnician Alphabet."—Mr. Simpson gave an interesting account of a sculptured tope represented on an old stone at Dras, near Ladak, which has, curiously, been overlooked by General Cunningham in his description of the same locality. The chief value of the representation of this tope is in its bearing on the form of the topes in the Jelalabad valley and near Peshawar. All the Indian topes, he showed, have round bases, while those on the other side of the Indus have square bases, with stairs, or the remains of them, leading up to the top of the square base, as exemplified in those found beyond the Khyber Pass.—Col. Yule exhibited a Lolo MS., written on red and blue satin, which had been recently sent to him by Mr. C. Baber the present Secretary of the Chinese Legation at Peking; and M. de la Couperie gave an account of the meaning of the writing, so far as the limited materials at present available admitted. M. de la Couperie stated that the MS. contained about 5750 words, ranged generally in verses of five words each, though in this the red and the blue sides did not generally agree; the writing, however, was not Chinese. M. de la Couperie added that the importance of the discovery by Mr. Baber can hardly be overrated, as it will probably give us the link for understanding the connection existing between the various members of a family of writings widely disseminated.—The Rev. Prof. Beal briefly stated some conclusions his recent studies had led him to with regard to the probable meaning of plate xxviii. fig. 1 of Mr. Fergusson's "Tree and Serpent Worship" (second edition), in which view the writer, who was present, concurred.

ROYAL SOCIETY OF LITERATURE

Dec. 14.—Mr. J. Haynes in the chair.—Mr. A. J. Ellis read a paper, contributed by Mr. A. Laurenson, "On the Colour Sense of the Edda," in which he showed the very curious ways in which the idea of colour presented itself to the Northmen, and offered an analysis of these views which will be probably new to most Western scholars.

NUMISMATIC SOCIETY.

Dec. 15.—Mr. J. Evans, President, in the chair.—Messrs. H. Dannenberg, E. Hucher, G. Schlumberger, and Prof. W. Tiesenhausen were elected Honorary Members.—Mr. R. A. Hoblyn read a paper, communicated by Mr. W. C. Homersham, "On the Groats with the Profile of Henry VIII., and, on the reverse, the inscription POSUI DEU' ADJUTORE' MEU'." One of these groats bore a legend incorporating the title of "King of Ireland," which, according to the generally received opinion, was only adopted simultaneously with the full-faced bust which on the groats of this king superseded the profile.—Mr. B. V. Head read a paper on the chronological sequence of the coins of Bœotia, in which he gave a sketch of the origin of the coinage in that district in the sixth century B.C., and traced it through its successive phases down to the time of the Roman conquest of Greece. In illustration of Mr. Head's paper a series of autotype plates of the coinage of Bœotia was exhibited.

THE CONSERVANCY OF RIVERS.

At the meeting of the Institution of Civil Engineers on Tuesday, the 6th of December, Mr. Abernethy, F.R.S.E., President in the chair, two papers on this subject were submitted. The first, relative to "The Eastern Midland District of England," by Mr. W. H. Wheeler, M. Inst. C.E., was read in an abridged form; and the second, which dealt with "The River Irwell," by Mr. A. Jacob, B.A., was unavoidably read in abstract. In opening the proceedings, the President expressed the hope that, in the course of the discussion, the conditions of other river basins would be considered.

Mr. Wheeler stated that he had selected the watershed drained by the Ouse, the Nene, the Witham, and the Welland, as typical of one peculiar class of rivers. This district was generally flat, the elevation at the heads of the rivers being only about 300 feet above the sea, and the strata were of a permeable character; consequently there was freedom from mountain torrents, and from the rapid discharge of water. The rainfall was small;

the industry pursued on the banks of the rivers was almost entirely of an agricultural character, and there was, therefore, no complication from the pollution of the streams by manufactories. These rivers discharged into a sandy bay, where there was a considerable rise and fall of the tide. Together they drained about 5,719 square miles of country, of which 668,241 acres were fenland. Their total length was 416 miles of trunk stream, or with the tributaries 872 miles, giving 8,155 acres to a mile of the former, and 4,315 acres to the latter. The mean capacity of the channels in ordinary floods was equal to 1 square foot of channel to every 816·6 acres. The rainfall on an average of the twelve years ending 1880 ranged from 17·39 inches in the driest seasons to 34·48 inches in the wettest, the mean being 26 05 inches. On the improvement of the main outfall of these rivers there had been spent during the last century about £2,000,000, and yet the lands drained by them were constantly subject to floods, and enormous loss had been incurred during the last few years in the destruction of crops. The author gave particulars of the various works which had been carried out, and of the peculiarities of each river as regarded flow of tide, discharging capacity, and the effect of rainfall in causing floods. It was contended that divided jurisdiction acted prejudicially on the efficient management of these rivers; that if the immense amount of money already spent had been applied under one general system for each river, it would have resulted in putting and keeping these rivers in a thoroughly efficient condition, and made them capable of receiving and discharging the largest floods.

The cause of floods was traced to subsoil drainage, the more efficient condition in which arterial drains and ditches were kept (so that the rain was more rapidly passed to the rivers), the destruction of woodlands, the draining of meres and lakes, which formerly acted as reservoirs, and also to an increase in the rainfall. From statistics kept at Boston it was shown that the annual rainfall had been steadily increasing, the averages over a long period having been: 1826-40, 22·45 inches; 1841-60, 23·25 inches; 1861-80, 24·89 inches. The average of the last few years had been 29·04 inches, the greatest quantity recorded during a like period, and 5·62 inches above the average of the last fifty years. No provision had been made for the more rapid discharge and the increased rainfall. Bridges and weirs remained as they were; while sufficient control was not exercised over millers and others having rights of water. Owing to the decay of the inland navigations, the works were in a neglected state, the channels becoming choked with deposit for want of dredging, and the weeds allowed to grow unchecked. The money that had been spent in improvements had been raised by the owners of lands in the lower reaches, and the conservators of these portions of the rivers offered the strongest opposition to any works above them that might send the water down more quickly, contending that, as those above had contributed nothing towards the cost of the works, they had no claim to take advantage of them. Even in "The Fens," where Conservancy Trusts existed, these were so split up into bodies having control only over sections of each river, that it was impossible to carry out any comprehensive scheme for the improvement and management of the whole river as the main outfall of the district. Any local scheme brought forward was violently opposed by all other interests, and an instance was given where £100,000 had been spent in Parliamentary and legal contests alone on one river; and the cost of obtaining Parliamentary powers for the improvements of another river had amounted to £150,000.

The Author contended that the whole history of the Fenland drainage showed the baneful result of divided administration, and taught that no voluntary or private legislation was sufficient. The administration of the several districts protected by Fen Acts was efficient so far as it went, and the schemes in force might serve as a model for any Conservancy Act that might be framed. But what was required was the consolidation of all the smaller Trusts, and the uniting them by representatives sent to one general Conservancy Board, which should have control of the main river and its banks from its source to the sea, as the main highway for the discharge of the water from the whole basin. The management of the interior drainage should be left to the Trusts already in existence, or, where none existed, to others formed under the powers of the Land Drainage Act. To supersede existing organisations by new Boards elected on a different plan would, in the Author's opinion, be most injudicious, and only lead to further complications and expense. The mode and area of rating were now well defined and understood, at least over the greater portions of the four Fen rivers, and any addition that might be required would be less felt than by a tax raised by a new Board on a different basis. The upper districts, where flooding now principally took place, must be prepared to bear the burden of the cost of any new works required for their relief. The necessity for the consolidation of all interests by representation on one general Conservancy Trust was shown by further operations for the improvement of the outfalls being still required; these rivers discharging into an estuary which was slowly warping up by deposit, the extension of the training of the outfall must be a continuous work, and however perfect the result might be at the conclusion of any extension, the channel would gradually deteriorate by the formation of sand-bars and deposit, the former due to the contention between the flood and ebb tides, and the latter to alluvial matter brought down by the river. With reference to the character of these works the Author considered that, in all training works, free action should be allowed to the ebb and flow of the tidal current, and that any choking of this resulted in a deterioration of the bed of the channel and the level of the low-water discharge. The tidal water being constant and continuous, and larger in volume than the fresh water, had much more influence in maintaining the channels. An example of this was given by a comparison of the Witham with the Ouse and the Nene, and their respective capacities for discharging floods. In the Witham the tidal current was stopped by a sluice 8 miles from its mouth, in the Nene and in the Ouse the tidal current had a free flow. The average level of low water of the same flood over a period of seven days was 16 feet 6 inches above low-water spring tides in the Witham, 7 feet 7 inches above in the Nene, and 5 feet 6 inches above in the Ouse. Further, in the Witham large deposits occurred in the bed of the channel during dry weather, whereas the deposition in the other rivers was only very slight. The Author was averse to the removal of mills and weirs, and contended that, by proper provision for flood discharges, these were quite compatible with good drainage; that the water held up in a river above the influence of the tidal flow was a decided advantage to the land and for water supply, and that to remove the weirs and allow the river to run at its natural level would drain the water too much from the land, and cause droughts worse in consequence than the most severe floods; and that water was valuable for obtaining power which might more frequently be used for agricultural purposes than at present.

The Author argued that as extreme floods only occurred occasionally, and at uncertain and distant intervals, there having been only twelve severe floods in the district treated of during the last thirty years, it was necessary to adapt the channel of the river to a normal discharge, and also for the reception of these occasional floods. This could be done by a modification of the system of Wash-lands adopted by the Dutch engineers for the drainage of the Fens. The main channel being made of sufficient capacity to carry ordinary floods, the sides above this height should be laid at a slope sufficiently flat to allow of the growth of grass, and the feeding of sheep and stock in the summer. The protecting banks should be set sufficiently far back to allow room for the passage of the greatest floods likely to occur. Bridges and other similar obstructions should be proportioned to the largest flow. To adapt the main channel to the discharge of extraordinary floods would not only involve enormous expense and waste of land, but the abnormal size would be detrimental to the channel itself, by the sluggish pace of the stream in ordinary times, and by allowing weeds to grow and shoals to form. The occasional flooding of the washes at the sides would be of little injury, and during the greater part of the year these would afford valuable pasturage. Even to provide for the continuous rainfall of 0·25-inch in twenty-four hours would require the channels of those four rivers to be enlarged to nearly three times their present size, their mean discharging capacity being now nearly equal to 0·094-inch of rain every twenty-four hours.

Mr. Jacob remarked that the river Irwell, which drained a water-shed of 311¾ square miles, took its rise near the town of Bacup, at an elevation of 1325 feet above the level of the sea. Passing southwards it was joined by several affluents, the principal of which were the Roch, the Croal, and the Bradshaw Brook. As the stream approached Manchester and Salford, the valley in which it flowed became wider, and the inclination of the river was much reduced. Near the source of the stream the declivity of the bed was 176 feet to a mile, which gradually diminished to 4 feet in a mile at Salford. From geological evidence it appeared that the valley had been from pre-historic times subject to inundation. The disastrous floods to which Salford and the district lower down the river were liable, had been considerably increased by foreign matter, which had partly filled the bed. This, which came from manufactories situated on the banks, consisted for the most part of furnace cinders, but all the waste products from paper works, dyeing, bleaching, and other industries, had been cast into the river unreservedly, and it was only by watchful care that the Corporation of Salford and the Bridgwater Navigation Company were able partially to check the evil. The erection of weirs, as well as the narrowing of the channel by the erection of mills and other buildings upon the margin of the river, had increased the tendency to flooding. Thus, owing to the natural characteristics, and the subsequent interference with the channel, the flooding of the urban parts of Salford, as well as of the rural districts extending from Salford to Warrington, had of late become more and more destructive. Several schemes had been propounded for the relief of Salford and Manchester, all pointing to the construction of a tunnel of sufficient capacity to carry away, during high floods, all water in excess of what the river-bed was capable of containing. It had been suggested that a relief channel would discharge the flood waters more rapidly than the river channel, and that in consequence the districts below would be inundated to a greater extent, for flood of any given dimensions, than at present. This, however, would not be the case, for the new channel, if properly controlled by sluices and judiciously used, would prolong the duration of the flood. Of late years flooding had become more frequent in the valley of the River

Irwell than formerly. In 1866 occurred the greatest flood that had been recorded during the present generation, and in December, 1880, an exceptionally high flood had laid a large area of the district under water. The flood of 1866 covered an area of 1100 acres, and the flood of 1880 an area, in the district of Broughton, of 300 acres, almost entirely occupied by dwelling-houses. Besides the recommendation to construct a tunnel for the discharge of surplus water, cutting off some of the bends in the river and dredging the channel were suggested, as well as the construction of sluices, to reduce the elevation of the surface caused by weirs. The embanking of the river where it passed through open ground was further recommended, but no substantial improvement had yet been carried out, owing to the difficulty of getting the several interests concerned to agree. When considering the best means of abating floods, the question of compensation reservoirs was not forgotten; but having regard to the large numbers of manufactories and other works situated on the river, and to the railways and canals and public roads which would be interfered with, it soon became evident that the outlay would be so heavy as to render the construction of compensating reservoirs unadvisable.

Any communication dealing with River Conservancy in its purely technical details only would be imperfect, and some reference was necessary to the principal points likely to arise regarding the constitution and administration of Conservancy Boards, as well as the definition of Conservancy Districts, and the incidence in taxation to cover the outlay on works. Conservancy Boards hitherto had usually possessed control over only a limited area of country along the stream, and had no jurisdiction over pollutions, which passed down the course of tributary streams into the river which the Board were charged to conserve. For this, as well as for other reasons, it was expedient that the watershed area should become the Conservancy district. The rights and responsibilities of riparian owners over tributary streams were well defined; no one could abstract water, or otherwise deal with a stream in such a way as to inflict injury upon others who had the privilege of using it. The erection of houses, the construction of streets, open spaces, and passages, and the laying of sewers for the removal of surface water and sewage, all tended to affect the natural streams of a country, either by polluting them or delivering the surface waters into them too rapidly. Again, one of the chief objects of the agriculturist was to remove surface water from the land, and to this end he deepened and improved ditches and other drainage outlets. These operations could not fail to affect the discharge of a river, and, this being so, there could not be any injustice in taxing upland owners to some extent for the maintenance of river works and the prevention of flooding. They should, therefore, be represented on the Conservancy Board, and it followed that expediency pointed to the watershed line as the proper boundary for a Conservancy district, unless the area enclosed was too large to admit of the administration of the Board being satisfactory.

In Germany the main streams of the country were generally the property of the State, which exercised control over them, and constructed such works as were necessary to preserve the navigation and supply water power. The Government recouped itself for the outlay out of tolls taken on the floatage, as well as from millowners and fees paid for the privilege of fishing. In France, also, the Government possessed the water right over navigable streams. Up to a late date the necessary expenses for maintenance were met, or partly so, by tolls, as in Germany; but the exaction of tolls had been discontinued, and the expenses were now chargeable to the national treasury. In both France and Germany the riparian owners, as a rule, looked after their own interests, forming themselves into societies or syndicates, for the purpose of carrying out and maintaining the necessary protection works.

Correspondence.

We do not hold ourselves responsible for or necessarily endorse the opinions expressed. Whatever is sent for insertion must be authenticated by the name and address of the writer, not necessarily for publication but as a guarantee of good faith.

PRESERVATION OF FOOD.

TO THE EDITOR OF THE SCIENTIFIC AND LITERARY REVIEW.

SIR,—How most efficiently to apply our existing food in the animal and vegetable forms so as always to have a surplus in hand in readiness for emergencies to enable the speculator to store up food as well as other commodities, without risk of destruction, in all articles of periodical produce, and especially in food, it will be found that the fluctuations in price are greatest in proportion to the difficulty of preservation. Three conditions are essential to the process of putrefaction, viz., heat, moisture, and still air. Without air everything is locked up and remains *in statu quo*. In direct opposition to these principles are the *granaries* of Great Britain and of other countries constructed. Here the weevil is naturalised in every crevice, like cockroaches in West Indian sugar ships, together with the existance of rats and mice, as well as of germination. In the exclusion of air is to be found the remedy. The practicability of this is neither difficult nor costly.

Close granaries should be constructed, either under or above ground, of cast iron, like gasometer tanks, or of brick or cement. They must be air-tight, and consequently water-tight. A manhole at the top is all the opening required, with an air-tight cover. An air-pump is adjusted for exhausting the air, and an archimedean screw for discharging the grain makes the whole apparatus complete. If we provide for wet grain, a water-pump might be added; and what is good on land is also good at sea.

Similar reservoirs or magazines on a smaller scale should be constructed for butchers or other provision dealers, and so with the fish brought to Billingsgate or to other markets, thus preventing the necessity of waste or of selling at ruinously low prices.—I am, Sir,

AUGUSTUS J. HARVEY, F.R.G.S.

6, Cromwell Terrace, Southtown,
Great Yarmouth, 1881.

RECENT AMERICAN AND FOREIGN PATENTS.

An improved *switch signal* has been patented by Mr. Richard B. Ireland, of Trenton, N. J. The object of this invention is to give notice of open or misplaced switches and draw-bridges by an alarm on approaching engines, and thereby obtain security against accident additional to the usual signals, The improvement consists in the combination, with the switch-operating mechanism, of a turning dog located near the rails, and used in connection with a gong-operating lever on the engine.

Hub.—Mr. John A. Hudgens, of Pine Bluff, Ark., has patented an improved hub, having a tapering metallic axle box provided with a circular shoulder near its inner end, against which the inner hub collar abuts when the wheel is put together. The portion of the periphery of the axle box which receives the hub collars or flanges and spokes, is made polygonal in form, and the remaining outer portion of the axle box is made cylindrical and screw-threaded on its outer surface to receive the nut which holds all together.

An improved *grain-cleaning machine* has been patented by Mr. Baxter Wright, of Marshall, Minn. This invention relates to certain improvements in grain-cleaning devices of that type in which one or more inclined sieves are provided with a series of check boards, which, reaching nearly to the sieve, retard the passage of the grain and facilitate elimination of the cockle and small seed, by causing them to pass through the said sieve, while the clean grain passes out at the end of the screen.

Electric Lamp improvements have been patented by Messrs. Edwin M. Fox and Ludwig K. Bohm, of New York city. This improvement relates to electric lamps in which vacuum chambers are employed, and its object is to facilitate the insertion and removal of the carbon, as well as the operation of drawing the vacuum, and to dispense with the usual operation of sealing the drawing nipple by melting. For these purposes the invention consists in the combination of a vacuum chamber formed with a neck and a sealing plug or stopper, having its longitudinal axis coincident with the longitudinal axis of the neck, and bearing the conducting wires; both the stopper and the neck being formed with openings arranged to be turned into or out of registration to permit the lamp to be first exhausted and then sealed.

Cultivator Shovel.—Mr. James F. King, of Aubrey, Kan., has patented an improved cultivator shovel. In this improvement, the point of the shovel is securely held in position by causing it to form a bevelled joint with the lower end of the upper plate, and backing the latter and the point, by a supporting plate rivetted to the upper plate and bolted to the point, and the whole secured to the standard of the plough by a bolt passing through both plates.

Calipers, &c.—Mr. Peter D. Graham, of Black Hawk, Col., has patented a combined calipers, rule, and beam compass. In this invention the calipers are formed with an arm extending backward from the joint which unites their legs. The outer end of this arm is formed or provided with a pointed extension which may be used as one of the legs of a beam compass by screwing the extension arm of the calipers on to a screw-threaded reduced portion of the end of a measuring rule, a sliding scriber or leg with caliper attachment being fitted for adjustment on the rule to complete the beam compass. By removing the calipers from the rule, then they and the rule may be used separately, and the pointed extension of the calipers' arm, when made detachable, may be used as a scratch awl. This makes a convenient combination of several instruments used in the same trade.

Air Compressor.—Messrs. Stillman W. Robinson and Lewis C. Kiser, of Columbus, O., have patented an air compressor. The frame of this machine is of triangular form, containing the air receiver within it and having four cylinders arranged at the corners of it, two of which are for air and two for steam, and a single shaft located at the apex of it. This shaft is provided at its opposite ends with cranks, each of which is connected with a pair of cylinders at one end of the compressor, which cranks are arranged to secure equalization of power and resistance. Such arrangement of parts is both compact and efficient. In this arrangement, also, two connecting rods are combined with a single crank by means of a block rigidly connected to one of the rods and turning upon the crank pin, and carrying also the joint pin for the other connecting rod, whereby frictional resistance is reduced. Furthermore, the air cylinder and eduction pipes have combined with them pockets containing the induction and eduction valves and passages. which pockets are made detachable and interchangeable to facilitate repair.

A Continuous rolling mill.—Mr. Christopher Lewis, of Columbus, Ohio, has patented an improved continuous rolling mill. This invention relates to mills for rolling rails, girders, plates, &c., and its object is to permit more rapid working and to reduce the manual labour ordinarily incident thereto. The invention is an improvement in that class of rolling mills in which several pairs of rolls have their alternate pairs arranged to be run in reverse direction to those next adjacent, and in which a laterally adjustable carriage takes the place and transfers it from one pair of rolls to the next, so that it is passed through one pair of rolls in one direction and is returned through the next pair of rolls in the reverse direction. The invention contemplates the taking of a piece of steel from the furnace in the shape of a bloom and entering it between the first pair of rolls, whence it proceeds on through the machine without handling and comes out a perfect rail: and to this end the improvement consists in combining the series of rolls whose alternate pairs have a reversed movement with a set of carriages of constantly increasing length, a set of tracks for carrying them from the line of one pair of rolls to the next, and a corresponding set of piston rods and steam cylinders grouped together at one side of the machine, which piston rods connect with the carriages to shift them at the will of the engineer in charge. The invention also comprises means for causing the ingot or unfinished rail to be fed forward to the rolls after the carriages bring them successively into line with the rolls; and also means for turning over the article being rolled to suit the different positions in which it may be required to be passed through the rolls.

A Cigarette Machine.—Mr. James A. Bonsack, of Bonsack's, Va., has patented an improved cigarette machine. This invention is an improvement upon a previously patented machine by the same party, and which comprised a combination of a concave with suitably covered rollers, and also a reciprocating belt for distributing and spreading the tobacco for a uniform and homogeneous feed, also a peculiar tapering tube having an endless belt passing through it for receiving the tobacco and causing it to be curled up longitudinally to form a filler, likewise a second endless belt, that carried the filler and a strip of paper through another tube that wrapped the paper around the filler and held it while being pasted. The present invention consists in a combination with a toothed distributing roller and a double concave, of a toothed roller at the entering side of the concave, for co-operation with the latter, to feed the stock to the distributing roller and prevent it from piling up on the outside. It also comprises a brush at the delivery end of the spreading belt and its reciprocating frame, for preventing the adhesion of tobacco to said belt; likewise a toothed belt operating in combination with toothed and plain rollers, to prevent piling; also a pressing roller for forcing the tobacco down between the teeth of the belt before passing beneath the concave; and a trough-like device for forming a continuous filler, composed of three endless belts and a pressing contrivance, backing strips applied to said belts, and pulleys for distending the latter. The invention also includes a holder for the cigarette and means for projecting said holder and the cigarette during the operation of cutting the latter.

A hot water generator has been patented by Mr. William W. Goodwin, of Philadelphia, Pa., the same forming a portable heater for use in heating water for bath tubs, basins, &c., as required, or for use in connection with a boiler, for maintaining a supply of hot water, either as a separate apparatus or in connection with gas cooking stoves and ranges. The invention consists in a closely wound water coil inclosed within a double cylindrical casing arranged so that the heated air passes lengthwise of the coil in both directions, and through the outer casing to the escape flue, whereby the heat is utilised to the greatest extent and the water in the coil is rapidly heated. It also consists in a combination with such heater of a hot water reservoir, with which the coil of the generator is connected.

Opener for oysters, clams, and other shellfish. It consists essentially in a sliding bar actuated by a lever handle and carrying an opening point or knife. An adjustable slotted standard is placed opposite the knife for supporting the oyster or clam. This invention has been patented by Mr. A. Ward, of Brooklyn, N. Y.

An improved steam pressure regulator has been patented by Mr. Howell A. Cummins, of Conneaut, Ohio. The invention consists, in combination with a valved steam pipe leading from a boiler, of a lever connected with a valve stem, and weighted at one end with a ball and at the other end with an empty tank or box nearly balanced by the ball. A box or tank containing mercury is connected with the steam pipe outlet and with the lever tank or box by tubular connections, so that when there is an excess of steam pressure in the steam pipe outlet, steam thereform will enter the mercury tank and force a portion of its contents into the lever tank, thereby drawing down the long end of the lever and closing or partly closing the valve and correspondingly cutting off the steam.

Lock Earring, patented by Mr. Fred. R. Bassett, of Paw Paw, Mich. The invention consists in bringing the hook to the pendant, and providing a spring for holding the hook open or closed, the hook being formed with square faces at the pivot for the impingement at one end of the spring upon either one of said faces, accordingly as the hook is thrown open or closed. This improvement not only gives greater convenience in attaching, fastening, and removing the ring from the ear, but less gold wire is required for the hook, no eye is needed for fastening the end of the hook, and the hook is not liable to be broken, as it does not have to be bent every time the ring is inserted and removed from the ear, as is the case with the ordinary style of hooks.

Improved Sofa Bed, free from complicated devices to adapt it for use as a sofa or a bed, and which may be adapted without unduly stretching or crowding its upholstery, has been patented by Mr. Herman A. W. Maercklein, of Hartford, Conn. In this improvement are hinged plates, which, when raised or closed, hold the back in a vertical position, and when lowered, permit the back to occupy a horizontal one. The stationary sofa arms and the lowering back have also combined with them bolsters hinged to said arms at their rear ends and avoiding the appearance of a hinge joint at the sofa front. Furthermore, the back and seat are connected by hinges having pin joints on a line with the tops of the springs in the seat, whereby all undue crowding and stretching of the springs are avoided.

Glove Fastening.—Mr. King G. Streeter, of Littleton, N.H., has patented a very neat and durable glove fastening. In this device a tubular shank, having an eye on its outer end, is secured to the glove on one side of the wrist opening. Through this eye is loosely fitted a wire bent in reverse directions at its opposite ends, which lattor have knobs which prevent the wire from dropping out of the eye. In using the fastener, one end of the wire is passed through the button hole in the glove wrist, and said rod or wire then used as a lever to draw the parts of the glove wrist together. The other end of the rod is next passed through the button hole, and the rod afterwards adjusted to bring its central portion within the eye, The button hole is fitted with an oblong eyelet to prevent the glove wrist from being worn or torn around the button hole.

An improvement in *escapements for watches*, &c., whereby a more regular and uniform movement is obtained, has been patented by by Mr. Edward Wensch, of Vienna, Austria. The invention consists in an anchor rod pivoted an the top plate of the works, and having its lower end T-shaped, with a tooth engaging with the escapement wheel at the ends of this T-shaped part, and the upper end of this rod provided with a fork surrounding an eccentric on the shaft of the balance wheel, above which eccentric there is a plate with a pin at the edge, which a spring presses against for imparting motion to the balance wheel. By these means the escapement wheel does not directly transmit the motive power of the clockwork to the balance, but the movement depends on the power of the above-named spring which always remains regular. For pendulum clocks, the construction is slightly modified.

An *automatic flood gate*, which can be removed from the flume very conveniently when desired, has been patented by Messrs. Cornelius B. Bradshaw and James Hewett, of Neillsville, Wis. Combined with the flume is a gate arranged to swing on horizontal pivots, and having an excess of weight below said pivots and an excess of superficial area above the pivots, which may fit in upright grooves in the sides of the flume. If the flume is empty the gate will be inclined and closed by the descent of its heavier lower end, and the water as it enters will be stopped by the gate. When, however, the flume is full, the water will act upon the gate to turn it into a horizontal position, or nearly so, and thus permit of the water flowing out of the flume. This automatic gate will be found to be of great service in floating wood, as it collects a quantity of water, and by suddenly releasing it produces a powerful current to float off the logs. It may be easily removed by an ordinary windlass when required, and if desired, may be provided with an operating lever and latch for locking it when closed.

Invalid Bedsteads.—Mr. Asahel J. Goodwin, of Brookline, Mass., has patented valuable improvements in invalid bedsteads. The improvements relate to invalid bedsteads having sectional bottoms fitted for adjustment to vary the angle of the sections to suit the comfort of the patient and the necessities of the case. The object of the invention is to permit a larger range and and variety of adjustment than has heretofore been possible, and also to obtain durable construction, combined with convenience of manipulation. The bed bottom is made up of a vertically adjustable central section, and two end sections fitted to swing for varying their inclinations, and one of which is in two parts hinged together. A stretcher also is used. The bed bottom sections are pivoted, and the head one works in slotted socket-plates having flanges to form bearings for the pivots, heads on which enter the slots that provide for the removal of the section. Said socket plates, which are applicable to other sections and parts, have circular projections at their backs which enter holes in the rails. An ingenious combination of cams, some of which are formed with folding ends to facilitate transportation, ratchets, racks, pinions, levers, and other devices, serve for adjustment of the sections, both separately and collectively, and for retaining them in position, the whole providing for nearly every possible position of the body.

THE ELECTRIC LIGHT.—In a notice of the various appliances for the electric light on view in the late Exhibition, mention is made of a lamp with enormous carbons, having an intensity equal to that of 150,000 candles, and proposed for service in lighthouses.